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Application Number: Patent Application No. 10-2002-0037624

15 Date of Application: June 29, 2002

Applicant(s): LG Electronics Inc.

20 **COMMISIONER**

**[ABSTRACT OF THE DISCLOSURE]**

**[ABSTRACT]**

The present invention relates to a tray assembly for microwave oven incorporating toaster. The microwave oven provided with a cavity for heating food 5 placed therein, an electrical device chamber that accommodates several electrical equipment components for generating microwaves to the cavity and a toaster provided in the electrical device chamber at front end thereof to be exposed, the microwave oven including a door hinged at the lower front portion of the toaster, to be rotatably opened and closed; a tray 74 being drawn towards the front direction according to the 10 opening/closing action of the door; and a plurality of through holes penetrating the top and bottom portions of the tray 74. The through holes are formed in pairs in the same length as the tray.

**[TYPICAL DRAWING]**

FIG. 3

15 **[INDEX WORDS]**

microwave oven, toaster, tray, crumb

**[SPECIFICATION]**

**[TITLE OF THE INVENTION]**

BREAD CRUMBS TRAY FOR MICROWAVE OVEN HAVING TOASTER

**[BRIEF DESCRIPTION OF THE DRAWINGS]**

5 FIG. 1 illustrates an exploded perspective view of a related art microwave oven;

FIG. 2 illustrates an exploded perspective view of a microwave oven incorporating a toaster in accordance with the present invention;

FIG. 3 illustrates a perspective view of the tray assembly included within the toaster in accordance with the present invention; and,

10 FIG. 4 is an exemplary plan view illustrating a tray in accordance with the present invention.

< Description of reference numerals in main portions of the drawings >

	20: cavity assembly	21: front plate
	22: cavity	23: electrical device chamber
15	24: cavity door	25: door handle
	27: outer case	30: toaster
	32: toaster panel	33: fixing hook
	34: hinge hole	37: tray entrance
	38: projection	40: toaster door
20	41: door panel	42: hinge pin
	43: toaster door handle	50: toaster case
	51: case front plate	52: case mouth
	53: case rear plate	53': spring hook
	54: moving slot	60: toaster front
25	62: toaster entrance	64: lever slot

	70: tray support	72: bushing
	74: tray	74a: through hole
	77: spring hook	79: spring
	80: heater assembly	90: crumb tray
5	91: tray body	91f: side wall
	91h: fastening hole	92: crumb tray handle
	94: coupling arm	95: extrusion
	97: fastening hook	98: rear flange

**[DETAILED DESCRIPTION OF THE INVENTION]**

10 **[OBJECT OF THE INVENTION]**

**[FIELD OF THE INVENTION AND DISCUSSION OF THE RELATED ART]**

The present invention relates to a microwave incorporating a toaster, and more particularly, to a tray assembly for a microwave oven which heats a lower portion of bread being placed in the tray in a vertical position as well as discharging crumbs of the 15 bread in an efficient manner.

Generally, microwave ovens are cooking appliances for heating an object by the application of microwaves. Construction of the microwave oven will now be described.

And the microwave oven includes generally a cavity 2 in which an object or food is heated by microwaves. The cavity is formed in an interior of a cavity assembly

20 **1. The cavity 2 is closed and opened by the cavity door 4.**

A component chamber 10 that accommodates several electrical equipment components for generating microwaves is positioned at one end of the cavity 2 (located at right part as seen in the figures) and is covered by an outer case 6. The electrical equipment includes a magnetron 12 for generating microwaves, a high-voltage

transformer 14 for supplying a high voltage to the magnetron 12, and a fan 16 for producing airflow in the cavity 2 to cool the heated electrical equipment.

Since the microwave oven heats the cooking object by means of microwaves, it is improper to toast bread. Accordingly, microwave ovens capable of toasting bread, as 5 well as cooking or heating the cooking object by means of microwaves have been developed.

To cope with the above request, there is designed a microwave oven having a toaster case positioned in front of an electric equipment component chamber 10. The toaster case is generally installed a heater assembly for correspondingly heat the both 10 surfaces of the bread being vertically stood.

#### **[TECHNICAL TASKS TO BE ACHIEVED BY THE INVENTION]**

And, bread being sliced is inserted into an entrance of the microwave oven including the toaster, in a vertical position, to be heated, and thereafter being heated at a constant temperature.

15 In such microwave ovens including a toaster, crumbs of bread are generated as the bread sliced in a predetermined width is heated within the toaster. Such crumbs shall be discharged to maintain an interior of the microwave oven including the toaster in a clean condition.

Furthermore, to make both sides of the sliced bread heated regularly, the heat is 20 ought to be transmitted in a regular form.

Therefore an object of the present invention is to provide a tray assembly including a tray for heating bread being placed therein in both sides regularly and discharging crumbs generated during the heating of the bread in an efficient manner, as well.

#### **25 [PREFERRED EMBODIMENTS OF THE INVENTION]**

To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a microwave oven provided with a cavity for heating food placed therein, an electrical device chamber that accommodates several electrical equipment components for generating microwaves to 5 the cavity and a toaster provided in the electrical device chamber at front end thereof to be exposed, the microwave oven including a door hinged at the lower front portion of the toaster, to be rotatably opened and closed; a tray 74 being drawn towards the front direction according to the opening/closing action of the door; and a plurality of through holes penetrating the top and bottom portions of the tray 74. The through holes are 10 formed in pairs in the same length as the tray.

In another aspect of the present invention, the through hole is formed in pairs in the same length as the tray, at the front and rear directions.

In another aspect of the present invention, the crumbs of the bread are guided downward through the through hole. Also, the lower portion of the bread is heated by 15 the heating assembly through the through hole, so as to heat the bread in both sides and in whole area, regularly.

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to 20 refer to the same or like parts.

FIG 2 illustrates an exploded perspective view of a microwave oven incorporating a toaster in accordance with the principals of the present invention. Referring to FIG 2, a cavity 22 is arranged within a cavity assembly 20 and an electrical device chamber 23 is arranged adjacent to the cavity 22. An object (e.g., food) arranged 25 within the cavity 22 may be heated by microwaves generated by various electrical

devices arranged within the electrical device chamber 23. The microwave oven shown in FIG. 2 includes a front plate 21.

The cavity 22 is opened and closed by a cavity door 24, selectively. If the cavity door 24 is closed, the cavity door 24 is in contact with the front plate 21 to cover the cavity 22. Reference number 25 indicates a door handle which is used by a user to open or close the cavity door 24.

The cavity assembly 20 and the electrical device chamber 23 are covered by an outer case 27 defining outer surfaces of upper and side portions of the microwave oven.

A toaster 30 is installed in the electrical device chamber 23 in such a way that it penetrates the front plate 21. The toaster 30 according to the present invention will now be described in detail with reference to Fig. 3.

A toaster panel 32 is provided at a front side of the toaster 30. Material of the outer surface of the toaster panel 32 is similar to or the same as that of the cavity door 24, so that the toaster panel 32 provides the microwave with a smooth front surface together with the cavity door 24 and a toaster door, as shown in Fig. 2. A rear of the toaster panel 32 is provided with a plurality of fixing hooks 33, to be fixed on the front plate 21.

The toaster 30 further includes a toaster door 40 hinged to the toaster panel 32. To this end, the toaster panel 32 has a hinge hole 34, while the toaster door 40 has a hinge pin 42. The material of the outer surface of the door panel 41 may be similar or identical to that of the toaster panel 32. At the lower portion of the door panel 41 is inserted a hinge hole 34 and the toaster door 40 may rotate around a hinge axis formed by the hinge pin 42 so as to be opened and closed. The toaster door 40 may be installed in such a manner that thereof a center of the gravity thereof is near the door handle 43 rather than the hinge pin 42. And, at the lower portion of the door panel 41 on which

the hinge pin 42 is formed is disposed an aperture 45.

The toaster 30 further includes a toaster case 50 installed at the rear side of the toaster panel 32. The toaster case 50 is coupled to the toaster panel 32 through a portion of the front plate 21 corresponding to the front side of the electrical device chamber 23. The toaster case 50 is made of metal and provides a space for toasting the 5 slice of bread.

There is a case front plate 51 at the front of the toaster case 50. The case front plate 51 includes a case mouth 52, through which a slice of bread may be placed into or removed from the toaster case 50. Meanwhile, there is a case rear plate 53 at the 10 rear of the toaster case 50. And, spring hooks 53' which are extended towards rear direction are provided at a lower portion of the case rear plate 53. The case rear plate 53 has a heater slot 53s for receiving a rear mounting boss 83'.

The toaster case 50 has a pair of moving slots 54 on its lower side walls. The pair of moving slots 54 formed within a concave portion 55 on the toaster case 50. The 15 concave portion 55 is formed as intruded inwardly the toaster case 50 so as to definite the moving height of a crumb tray 90. A bushing 72 is movable along the moving slot 54.

A toaster front 60 being made of metal substance is provided at the front of the case front plate 51 and is positioned in an interior of the toaster panel 32. The toaster front 60 has a plurality of toaster entrances 62 formed in a rectangular at upper and 20 lower directions, which are exposed when the toaster door 40 is opened. Each of the toaster entrances 62 is coupled to a respective case mouth 52 of the case front plate 51. Reference number 64 indicate lever slot.

A protector 65 is interposed between the toaster front 60 and the toaster panel 32. The protector 65 is made of insulating material to protect heat from being transferred to the toaster panel 32 from the toaster front 60.

A tray support 70 is installed inside the toaster case 50. There are disposed 5 bushings 72 at right and left sides of the tray support 70. The bushing 72 supports the tray support 70 and is moved along the moving slot 54 provided on each side of the toaster case 50. The tray support 70 supports at least one tray 74 in which each slice of bread is vertically positioned. The trays 74 are formed in the same number as the toaster entrances 62, and are protruded in a predetermined length towards the entrance 10 62 when the toaster door 40 is opened.

One end of the connecting lever 76 is coupled to the lower portion of the toaster door 40. The other end of the connecting lever 76 is hinged to the bushing 72. The connecting lever 76 is penetrated through the lever slot 64 and protruded to the front side of the toaster front 60.

15 The one end of the connecting lever, which is hinged to the bushing 72 is connected to one end of the spring 79. The other end of the spring 79 is hanged on spring hook 53' of the toaster case 50. The spring 79 pulls the end of the connecting lever 76 toward the spring hook 53'.

20 There is a heater assembly 80 mounted in the toaster case 50. The heater assembly is configured of a heating plate 82 and a supporter 85.

A tray assembly, T, arranged within the interior of the toaster case 50 will now be described detail with reference to FIG. 3. As shown in FIG. 3, the tray assembly T includes a tray support 70 and trays 74 securely arranged on top of the tray support 70. In one aspect of the present invention, the tray 74 may include a plurality of extensions 25 74a and hooks 74b, both being extended towards the lower portion, for supporting a

food item arranged vertically thereon. The hooks 74b are extended towards the lower and rear portion of the tray. And, the extensions 74b include projections 74c protruded outwardly therefrom.

At the top portion of the tray support 70, on which the tray 74 is securely arranged, are formed a first and second fastening slits 70a and 70b into which the extensions 74a and the hooks 74b are inserted. At the side wall of the tray support 70, which corresponds to the lower portion of the first fastening slit 70a is formed a hole 70c.

The hooks 74b of the tray 74 are inserted into the second fastening slit 70b at the rear direction, the hooks 74b being engaged with the rear portion of the tray by pushing the tray 74 towards rear direction. At this position, if the extensions 74a are inserted into the first fastening slit 70a, the projections 74c are elastically slip fit engaged with the hole 70c, thereby the front portion of the tray 74 are automatically engaged with the tray support 70.

On the other hand, the tray 74 may be easily disassembled (detached) from the tray support 70 upon initially detaching the plurality of extensions 74a from the first fastening slit 70a by detaching the plurality of fastening hooks 74b from the corresponding first plurality of the second fastening slit 70b.

Accordingly, the tray 74 is easily detached from the tray support 70.

One end of the connecting lever 76 is coupled to the lower portion of the toaster door 40, while the other end of the connecting lever 76 is hinged to the bushing 72. The connecting lever 76 is penetrated through the lever slot 64 and protruded to the front side of the toaster front 60. The one end of the connecting lever, which is hinged to the bushing 72 is connected to one end of the spring 79. The other end of the spring 79 is hanged on spring hook 53' of the toaster case 50. The spring 79 performs elastic

force to pull the end of the connecting lever 76 toward the rear portion of the moving slots 54.

There is a heater assembly 80 mounted in the toaster case 50. The heater assembly 80 is formed on side walls corresponding to each other, so as to heat both 5 sides of the bread.

There is the crumb tray 90 slidably received and installed in the toaster case 50 through the lower portion of the toaster panel 32. On the crumb tray 90 is mounted a tray body 91 made of metal substances. The tray body 91 is in a rectangular shape being extended to front and rear directions, and side walls 91f are formed at four edges 10 of the tray body 91 in a predetermined height. In the meantime, the tray body 91 includes a crumb storage 91' therein, the top of which is opened. The crumb storage 91' serves to receive the crumbs generated from the bread during the heating of the bread at the upper portion of the tray 74.

The side walls 91f are formed at the rest of the tray except for the front end of 15 the tray body 91, which has a rear curved flange 91b at the top portion thereof. The rear flange 91b serves as reinforcing the top portion of the side walls 91f and preventing the metal parts from being exposed to the outside. At the front end of the tray body 91 is formed a plurality of fastening holes 91h.

To this end, a crumb tray handle 92 is provided at a front portion of the crumb 20 tray 90. The crumb tray handle 92 is made of the same material as the door panel 41, which is extended towards the bottom portion lower than the tray body 91, so as to enable users to grip the same.

There is a coupling arm formed at the tray handle 92 to make the front end of the tray body 91 inserted thereinto. The coupling arm 94 is extended in the rear portion 25 of the crumb tray handle 92, so as to surround the lower portion of the tray body 91 and

an exterior and top portions of the side walls 91f. The coupling arms 97 as described above are formed at both ends of the crumb tray handle 92. One of the coupling arms 94 being corresponded to the tray body 91 is formed an extrusion 95 which is inserted into the fastening hole 91h from the lower portion of the tray body 91.

5 The crumb tray handle 92 is arranged on the aperture 45 between the hinge pin 42 of the toaster door 40, which the tray body 91 is penetrated through the tray entrance 37 of the toaster panel 32. The crumb tray handle 92 is also made of the same material as the door panel 41.

10 The operation of the microwave oven incorporating a toaster according to the present invention will now be described in detail.

If a user opens the toaster door 40, a predetermined portion of the tray 74 projects from the toaster entrance 62. In one aspect of the present invention, the predetermined portion of the tray 74 projects from the toaster entrance 62 when the toaster door is completely opened. Next, bread 'B' may be placed in a vertical position 15 on the tray 74 by a user. If the toaster door 40 is closed, the bread will be moved inside the toaster case 50 as the tray 74 moves inwardly. Next, if power is supplied to a heater 80, the toaster starts to toast the bread 'B' by generating heat from the heating element wires of the heating plate.

20 The crumb generated from the bread during the heating procedure may be dropped down on the crumb tray 90, while some parts will be remained on the tray assembly T which is configured of the tray 74 and tray support 70. In accordance with the present invention, the tray 74 and the tray support 70 may be easily detached from each other, thereby making it easier to clean the tray assembly.

25 As seen from above the tray 74 and the tray support 70 are easily assembled and/or disassembled from each other.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of  
5 the appended claims and their equivalents.

**[EFFECT OF THE INVENTION]**

As seen from above the tray 74 and the tray support 70 are easily assembled and/or disassembled from each other. Accordingly, users can easily clean the tray assembly T and fix or maintain the assembly in an effective manner.

**What Is Claimed Is:**

1. A tray in a microwave oven provided with a cavity for heating food placed therein, an electrical device chamber that accommodates several electrical equipment components for generating microwaves to the cavity and a toaster provided in the electrical device chamber at front end thereof to be exposed, the tray comprising:

5 a door hinged at the lower front portion of the toaster, to be rotatably opened and closed;

10 a tray 74 being drawn towards the front direction according to the opening/closing action of the door; and,

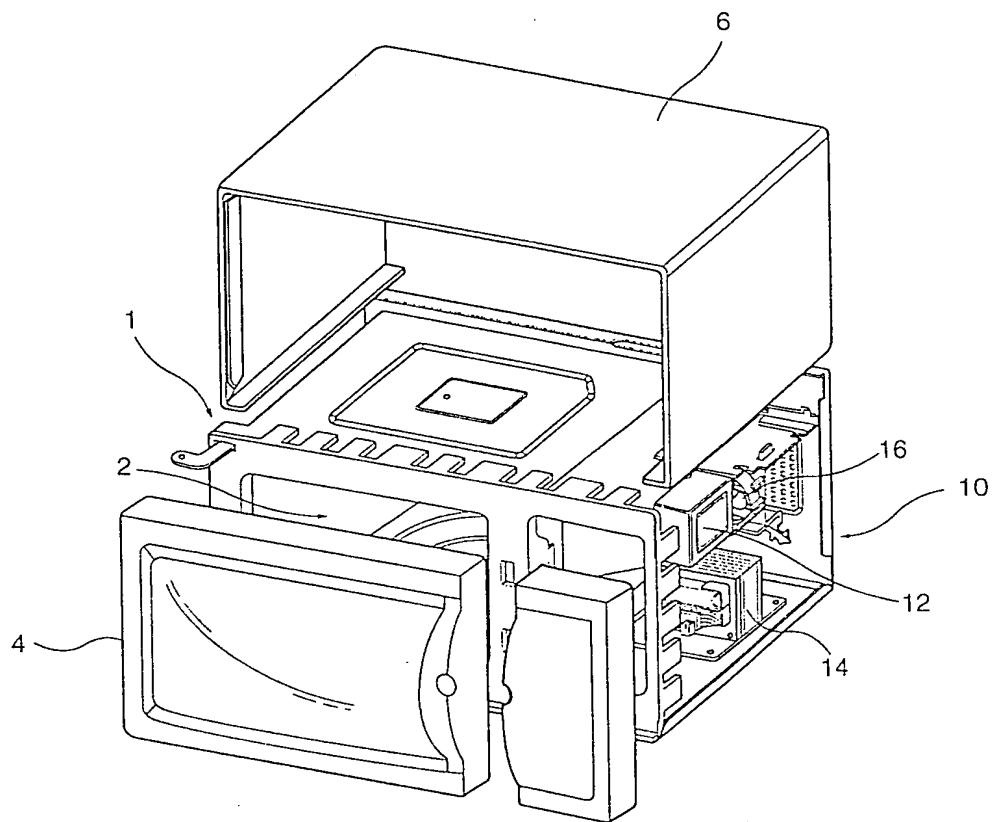
a plurality of through holes penetrating the top and bottom portions of the tray 74.

The through holes are formed in pairs in the same length as the tray.

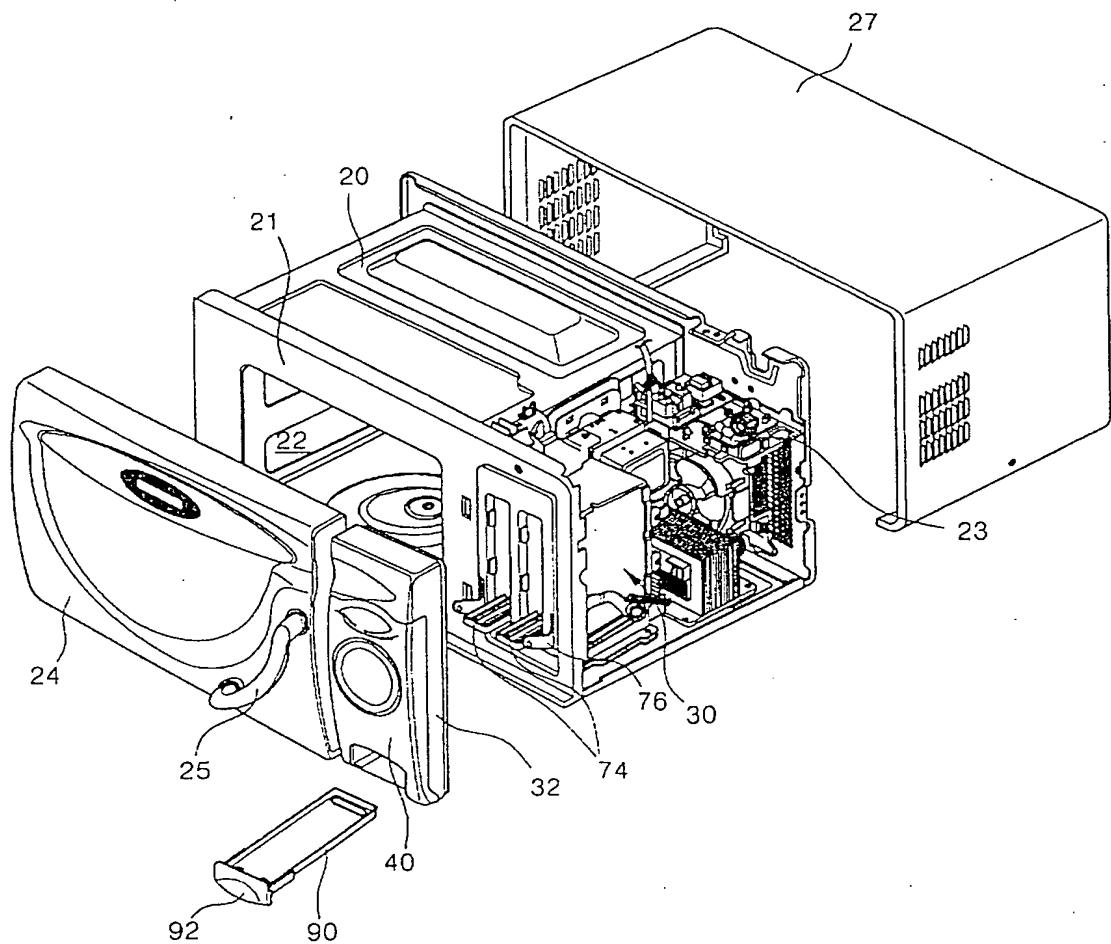
2. The tray as claimed in claim 1, wherein the through hole is formed in pairs in 15 the same length as the tray, at the front and rear directions.

## [Drawings]

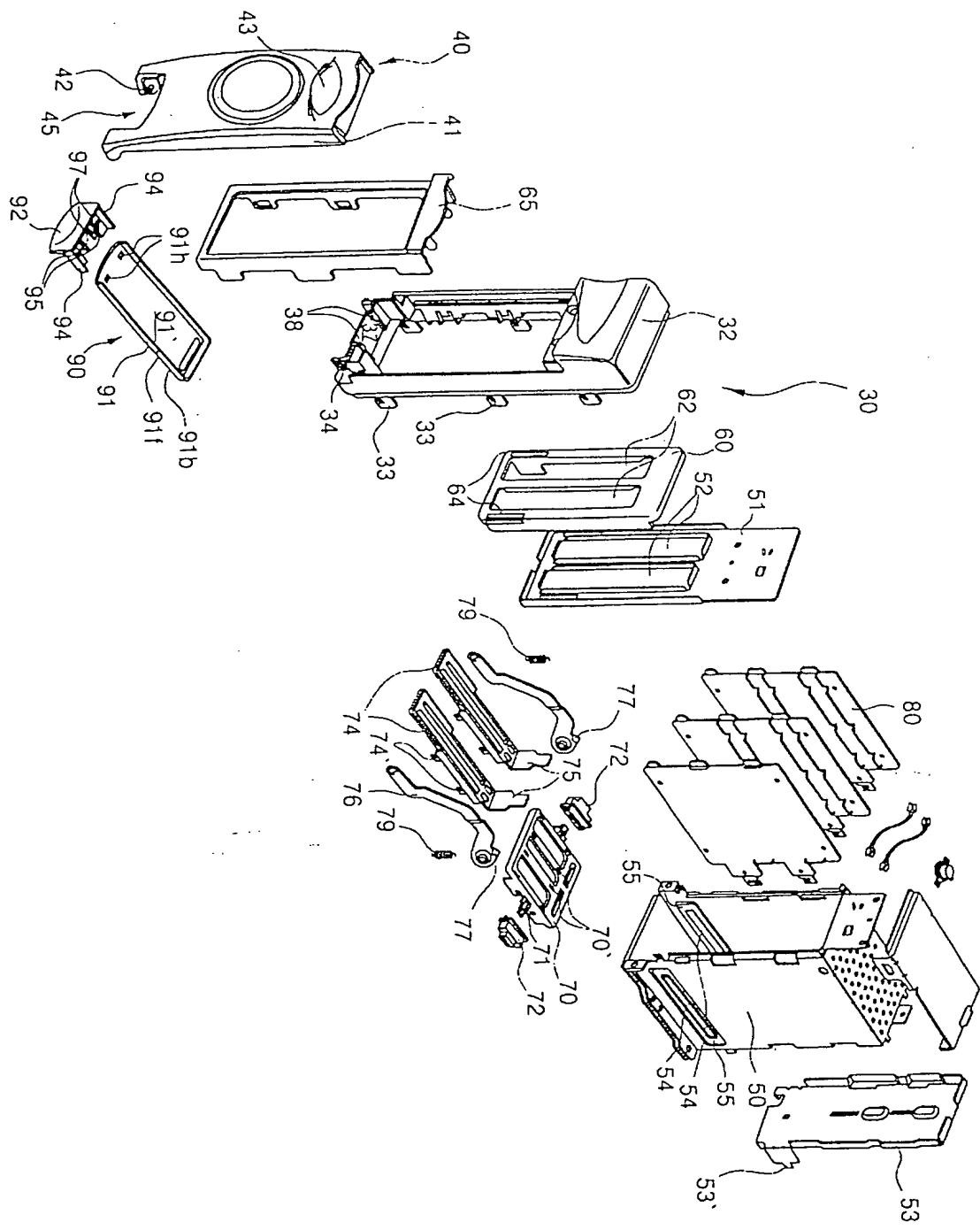
[FIG. 1]



[FIG. 2]



[FIG. 3]



[FIG. 4]

